a third layer of a smooth, fine-grained κ-Al_2O_3-layer having a thickness of 1-9 μm; and

the cemented carbide body having a surface zone depleted of cubic carbides.

28. The cutting insert according to Claim 27, wherein $x+y+z=1$ with $z < 0.5$ in the first layer and $x+y+z=1$ with $x > 0.3$ and $y > 0.3$ in the second layer.--

REMARKS

Reconsideration of the August 22, 1997, Official Action is respectfully requested.

The various issues raised in the Official Action are discussed in the order in which they appear in the Official Action.

Applicants reaffirm the election of the invention covered by Claims 1-11. The new claims are directed to the elected invention. Upon allowance of a generic product claim, rejoinder of the remaining claims is respectfully requested in view of the Commissioner's Notice in the March 26, 1996 Official Gazette (1184 OG 86). According to this Notice, when product and process claims are presented in the same application, the claims to the non-elected invention will be withdrawn but in the case of an elected product claim, rejoinder will be permitted when a product claim is found allowable and the withdrawn process claim depends from or otherwise includes all the limitations of an allowed product claim.

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Claims 1-8, 10 and 11 stand rejected under 35 U.S.C. § 112, first paragraph, for the reasons set forth on page 3 of the Official Action. In particular, the Official Action alleges that the x, y, z formulation relationships are "critical" and must be recited in the claims. Although no reasons are given in support of the rejection, In re Mayhew, 188 USPQ 356 (CCPA 1976) is cited as authority for the rejection. In Mayhew, a rejection of certain method claims for failure to recite "a cooling zone" or location of a portion of a bath cooled was affirmed but the rejection of other method claims which failed to recite a temperature range or function of the cooling zone was reversed. Mayhew did not involve a rejection of product claims for failure to include stoichiometry of a coating compound. The rejection is respectfully traversed for the following reasons.

It is well established that "a claim may be broader than the specific embodiment disclosed in a specification...." See, In re Rasmussen, 211 USPQ 323, at 326 (CCPA 1981). Further, as pointed out by the court in In re Johnson, 194 USPQ 187, at 195 (CCPA 1977), "to demand that the first to disclose shall limit his claims to what he has found will work or to materials which meet the guidelines specified for 'preferred' materials in a process such as the one herein involved would not serve the constitutional purpose of promoting progress in the useful arts." In the present case, Applicants have presented claims which distinguish the invention over the prior art and which are supported by the specification. Nothing more is required. That is, as pointed out by the court in In re Fuetterer, 138 USPQ 217, at 220 (CCPA 1963):

> "It is the function of the 'written description' of the invention to 'enable' one skilled in the pertinent art to 'make and use' the invention, and...the claims have a separate and distinctive function, namely, particularly to point out and distinctly claim what 'applicant regards as his invention.'"

From the foregoing, it should be clear that 35 U.S.C. §112, first paragraph, does not require the claims to set forth specific x+y+z values. Accordingly, withdrawal of this ground of rejection is respectfully requested.

Claims 1-11 were rejected under 35 U.S.C. § 102(e) as allegedly being unpatentable over U.S. Patent No. 5,545,490 ("Oshika"). The reasons for the rejection are set forth on page 4 of the Official Action. This rejection is respectfully traversed for the following reasons.

Claim 1 sets forth a cutting tool insert for turning of steel comprising a cemented carbide body and a coating thereon, the cemented carbide body including WC, 5-11 wt % Co and 2-10 wt % cubic carbides of groups IVb, Vb and/or VIb of the periodic table and a highly W-alloyed binder phase with a CW-ratio of 0.76-0.92, the coating comprising a first layer of $TiC_xN_yO_z$ having a thickness of 0.1-2 μm and equiaxed grains <0.5 μm in size; a second layer of $TiC_xN_yO_z$ having a thickness of 3-15 μm and columnar grains <5 μm in diameter; and a third layer of a smooth, fine-grained κ-Al_2O_3-layer having a thickness of 1-9 μm. The combinations of features recited in Claim 1 and in the claims dependent thereon are not disclosed or suggested by Oshika.

The invention relates to a coated cutting tool useful for difficult cutting conditions such as turning of hot and cold forged low alloyed steel components like gear rings and

axles used in the automotive industry and turning of stainless steel components like bars, tubes and flanges (specification at page 1, lines 9-12). Stainless and low alloyed steels are materials which, in general, are difficult to machine with coated or uncoated cemented carbide tools (specification at page 1, lines 15-16). Smearing of workpiece material onto the cutting edge and flaking of the coating often occur (specification at page 1, lines 16-17). The cutting conditions are particularly difficult during the turning of forged low alloyed components under wet conditions using a coolant (specification at page 1, lines 17-19). The hot forged skin is generally decarburized and thus softer than the bulk material due to a mainly ferritic structure (specification at page 1, lines 19-21). The cold forged skin is cold-worked and thus harder due to a deformation (strain hardening) effect (specification at page 1, lines 21-22). Moreover, the ferrite/pearlite bulk structure of such material is often "ferrite/striated" meaning that the ferrite and pearlite form parallel stripes (specification at page 1, lines 22-24). This mixture of hard and soft materials makes the cutting conditions very difficult (specification at page 1, lines 24-25).

When turning stainless and low alloyed steels using coated cemented carbide tools, the cutting edge is worn by chemical wear, abrasive wear and by a so called adhesive wear (specification at page 1, lines 26-28). The adhesive wear is often the tool life limiting wear and can occur when fragments or individual grains of the layers and also parts of the cemented carbide are successively pulled away from the cutting edge as workpiece chips are formed (specification at page 1, lines 28-31). When wet turning is employed, the wear may also be accelerated by an additional wear mechanism (specification at page 1, lines 31-32).

Coolant and workpiece material may penetrate into cooling cracks of the coatings and such penetration can lead to a chemical reaction between workpiece material and the coolant with the cemented carbide (specification at page 1, lines 31 and Page 2, lines 1-3). The Co-binder phase may oxidize in a zone near the crack and along the interface between the coating and the cemented carbide (specification at page 2, lines 3-4).

An object of the invention is to avoid or alleviate problems associated with prior art cutting inserts (specification at page 2, lines 23-24). According to one embodiment of the invention, a turning tool insert is provided with a cemented carbide body and the cobalt binder phase is highly alloyed with W (specification at page 4, lines 13-18). The coating preferably comprises a first (innermost) layer of $TiC_xN_yO_z$ with equiaxed grains, a second (intermediate) layer of $TiC_xN_yO_z$ with columnar grains, and a third layer of a smooth, fine-grained Al_2O_3 consisting essentially of the κ-phase (specification at page 5, lines 1-10). As shown in the examples of the present specification, the claimed cutting tool exhibits unexpected results with respect to difficult cutting conditions such as turning of hot and cold forged alloyed steel components.

Oshika discloses a cutting tool which includes a substrate coated with a composite hard layer including an inner layer having one or more layers of titanium carbide, titanium nitride, titanium carbonitride, titanium carboxide, and titanium oxicarbonitride, and an outer layer having at least one alumina layer, wherein the alumina contains a K-type alumina layer (col. 2, lines 42-56 of Oshika). Oshika states that friction between steel chips and the tool is unlikely to occur because K-type alumina demonstrating orientation to the

face A makes the surface of the coated layer smooth (col. 2, lines 57-64 of Oshika). However, there is no suggestion in Oshika of the claimed cutting tool having a first layer of $TiC_xN_yO_z$ with equiaxed grains, a second layer of $TiC_xN_yO_z$ having columnar grains, and a third layer of a smooth, fine-grained κ-alumina layer. As such, withdrawal of this ground of rejection is respectfully requested.

Claims 1-11 were rejected under 35 U.S.C. § 103 as allegedly being unpatentable over U.S. Patent No. 5,071,696 ("Chatfield") in view of U.S. Patent No. 4, 610,931 ("Nemeth"). The reasons for the rejection are set forth on page 5 of the Official Action. This rejection is respectfully traversed for the following reasons.

In the Official Action, Chatfield is cited for a disclosure of a κ-alumina coated cemented tungsten carbide tool with an oxicarbonitride layer therebetween and Nemeth is cited for a disclosure of a substrate having a depleted cubic carbide zone and a multi-layered coating. The Official Action alleges that it would have been obvious to modify Chatfield to include the substrate of Nemeth. However, as explained below, even if Chatfield and Nemeth are combined in the manner suggested in the Official Action, the resulting combination still fails to suggest the claimed invention.

Chatfield discloses a cutting insert having a substrate of cemented carbide coated with at least one layer of Al_2O_3 and one layer of TiC in which the Al_2O_3-layer is in epitaxial contact with the adjacent TiC-layer, the Al_2O_3 comprising kappa- or theta-Al_2O_3 (col. 4, lines 45-52 of Chatfield). The coated body is heat treated so that at least 90% and preferably at least 98% of the initially nucleated kappa- or theta-Al_2O_3 is transformed to

alpha-Al_2O_3 (col. 4, lines 52-55 of Chatfield). In Example 1 of Chatfield, kappa-Al_2O_3 was nucleated in contact with TiC and in Example 2 the kappa-phase was transformed to alpha-phase (col. 5, lines 24-60 of Chatfield). Accordingly, it should be clear that Chatfield fails to suggest the claimed cutting tool insert which includes a first layer of $TiC_xN_yO_z$ having equiaxed grains, a second layer of $TiC_xN_yO_z$ having columnar grains, and a third layer of kappa-Al_2O_3. Further, since Nemeth is only relied on for a suggestion to modify the substrate of Chatfield, it should be clear that the combination of Nemeth with Chatfield cannot possibly produce the claimed invention.

It is submitted that the differences between the claimed subject matter and the prior art are such that the claimed subject matter, as a whole, would not have been obvious at the time the invention was made to a person having ordinary skill in the art.

In view of the foregoing, it is submitted that the present application is in condition for allowance and such action is earnestly solicited.

Respectfully submitted,

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